



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,192	12/15/2003	Vidya Pundalik Kamath	131037-1/YOD GERD:0070	4365
41838 7590 10/15/2007 GENERAL ELECTRIC COMPANY (PCPI) C/O FLETCHER YODER P. O. BOX 692289 HOUSTON, TX 77269-2289			EXAMINER ALLISON, ANDRAE S	
			ART UNIT 2624	PAPER NUMBER
			MAIL DATE 10/15/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/736,192

Applicant(s)

KAMATH ET AL.

Examiner

Andrae S. Allison

Art Unit

2624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 July 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Remarks

1. The Office Action has been issued in response to amendment filed July 26, 2007. Claims 1-27 are pending. Applicant's arguments have been carefully and respectfully considered in light of the instant amendment, and are not persuasive. Accordingly, this action has been made FINAL.

Response to 102 Arguments

In response to applicant's argument on page 8-9 that the Giger fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (automatically segmenting the breast lesion preprocessing in the region of interest) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In response to applicant's argument on page 8-9 that the Giger reference fail to teach Giger fail to teach automatically segmenting the breast lesion in a preprocessed region of interest, the Examiner partially agrees. Giger does in fact teach automatically segmenting the breast lesion because extracting can be equated to extracting. However, because the smoothing step is done after extraction, the Examiner agrees that is not a preprocessing step. Therefore, the Examiner introduces Gaborski et al (US Patent No.: 5,857,030) to cure the deficiency of Giger.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-6, 11, 13-15, 16-20 and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Giger et al (US Patent No.: 5,984,870) in view of Gaborski et al (US Patent No.: 5,857,030).

As to claim independent claim 1, Giger discloses an automated method for determining a plurality of characteristics of a breast lesion (method for computerized analysis of lesions, column 1, lines 15-17), the method comprising: automatically identifying a region of interest in an image (determine initial location of the lesion, column 4, lines 45-46), the region of interest comprising the breast lesion; preprocessing the region of interest to enhance a quality of the image; automatically segmenting the breast lesion in the region of interest (extract lesion from image, column 4, lines 50-51); automatically measuring a plurality of measurements for determining the plurality of characteristics of the breast lesion (image data is passed through texture measuring circuit, column 11, lines 16-17); and automatically classifying the breast lesion as benign or malignant based on the plurality of measurements (classify lesion as benign or cancerous based on output from a classifier, column 4, lines 55-62).

However, Giger does not teach preprocessing the region of interest to enhance a quality of the image. Gaborski discloses a method for processing radiographic images (column 1, lines 7-9) that include the step of teach preprocessing the region of interest to enhance a quality of the image (see column 3, lines 34-35). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have modified the method for computerized analysis of lesions of Giger with the method for processing radiographic images of Gaborski to enhance object to background contrast (column 3, lines 35-38), thus making it easier to extract a breast lesion.

As to independent claim 15, this claim differs from claim 1 only in that claim 15 is system whereas, claim 1 is method and the limitations memory unit and processor are additively recited. Giger clearly teaches a system comprising: a memory unit (1009, see Fig 15); and at least one processor (290, see Fig 16).

As to independent claim 26, all the limitations are discussed above except "computer-readable medium storing computer instructions for instructing a computer system to determining a plurality of characteristics of a breast lesion." Giger teaches computer-readable medium (1009, memory unit, see Fig 15) storing computer instructions (software; column 11, lines 45-46) for instructing a computer system to determining a plurality of characteristics of a breast lesion.

As to independent claim 27, Giger teaches a system (see Fig 15) for determining

a plurality of characteristics of a breast lesion, the system comprising: the means for automatically identifying a region of interest in an image, the region of interest comprising the breast lesion is the lesion location circuit (see Fig 15); the means for preprocessing the region of interest to enhance a quality of the image ; the means for automatically segmenting the breast lesion in the region of interest is feature extraction circuit (see Fig 15); the means for automatically measuring a plurality of measurements for determining the plurality of characteristics of the breast lesion is the shape circuit; and the means for automatically classifying the breast lesion as benign or malignant based on the plurality of measurements is the classifier circuit (see Fig 15). However, Giger does not teach the means for preprocessing the region of interest to enhance a quality of the image. Gaborski discloses a system for processing radiographic images (see Fig 1) that includes the means for preprocessing the region of interest to enhance a quality of the image (20, see Fig 1). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have modified the system for computerized analysis of lesions of Giger with the system for processing radiographic images of Gaborski to enhance object to background contrast (column 3, lines 35-38), thus making it easier to extract a breast lesion.

As to claim 2, Giger teaches the method, wherein the automatically measuring step comprises measuring a shape of the breast lesion based on a plurality of shape measurements (column 7, lines 6-7).

As to claim 3, Giger teaches the method, wherein the plurality of shape measurements comprises a plurality of margin characteristics (see column 7, lines 5-7, where the shape a lesion is calculate based on its long-to-short axis ratio from the margin).

As to claim 4, Giger teaches the method, wherein the plurality of shape measurements includes regularity of a boundary of the lesion and a plurality of margin characteristics (see column 7, lines 5-16 where the long-to-short axis ratio from the margin and the irregularity of a lesion is calculated).

As to claim 5, Giger teaches the method, wherein the classification of the lesion comprises a rule based system, the rule based system applying a plurality of pre-determined rules on the plurality of characteristics to indicate the condition of the lesion (see column 8, lines 38-62, where a classifier uses a plurality of features extracted from a lesion to indicate the condition of the lesion).

As to claim 6, Giger teaches the method, wherein the plurality of pre-determined rules include a tall wide ratio (long-to-short axis ratio; column 8, line 6-7), posterior echo enhancement (see Fig 7B), posterior shadow (see Fig 7A), and regularity measure (irregularity measure, column 8, line 14).

As to claim 11, note the discussion above, Gaborski teach the method wherein the preprocessing using an edge preserving smoothing filters (column 3, lines 31- 46).

As to claim 13, note the discussion above, Gaborski teaches the method, further comprising applying a multi-scale morphology technique to remove speckles from the region of interest (column 4, lines 30-56).

As to claim 14, Giger teaches the method, wherein the image is generated by an ultrasound system (column 8, line 56).

Claims 16-20 differ from claims 2-6 only in that claims 2-6 are method claims whereas, claims 16-20 are system claims. Thus, claims 16-20 are analyzed as previously discussed with respect to claims 2-6 above.

4. Claims 7-10 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Giger et al (US Patent No.: 5,984,870) in view of Gaborski et al (US Patent No.: 5,857,030) further in view of Kuhn (US Patent No.: 5,982,916).

As to claim 7, Giger does not expressly disclose the method, wherein the automatically segmenting step comprises generating a three-dimensional plot of the image; wherein the three-dimensional plot comprises a plurality of hills and valleys determined based upon a threshold value. Kuhn discloses a method for automatically locating a region of interest in an image (column 1, lines 7-8) that includes wherein the

automatically segmenting step comprises generating a three-dimensional plot of the image; wherein the three-dimensional plot comprises a plurality of hills and valleys determined based upon a threshold value (see column 7, lines 23-37 and column 8, lines 43-60, where a histogram is created from the image data and the minimum and maximum intensity values are calculated based on a threshold value). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have combined the teachings of Giger as modified by Gaborski and Kuhn for locating a region of interest in a digitized mammogram of a breast image by forming an histogram of the image data and determining the local minima and maxima.

As to claim 8, Kuhn teaches the method, further comprising slicing a topology of the three-dimensional plot at the threshold value (column 5, lines 21-23).

As to claim 9, note the discussion above, Kuhn teaches the method of, further comprising processing the three-dimensional plot to estimate the region of interest in the image (column 4, lines 16-17).

As to claim 10, note the discussion above, Kuhn teaches the method, wherein the identifying step comprises applying an inverted trough method to identify the region of interest (see column 2, lines 65-67, where a minimum intensity value is used to identify a region of interest).

Claims 21-24 differ from claims 7-10 only in that claims 7-10 are method claims whereas, claims 21-24 are system claims. Thus, claims 21-24 are analyzed as previously discussed with respect to claims 7-10 above.

5. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Giger et al (US Patent No.: 5,984,870) in view of Gaborski et al (US Patent No.: 5,857,030) further in view of Li et al (US Patent No.: 6,654,728).

As to claim 12, Giger does not expressly disclose the method, further comprising applying a fuzzy enhancement technique to distinguish between a brighter region and a darker region. Li discloses a method for digital processing of radiological images that includes applying a fuzzy enhancement technique to distinguish between a brighter region and a darker region (see column 4, lines 5-15, where fuzzy logic is used to identify and classify of masses and tumors). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to have combined the teachings of Giger as modified by Gaborski and Li for the identification and classification of micro-calcification clusters or masses in breast cancer using ultrasound images (column 39-50).

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Inquires

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrae S. Allison whose telephone number is (571) 270-1052. The examiner can normally be reached on Monday-Friday, 8:00 am - 5:00 pm, EST.

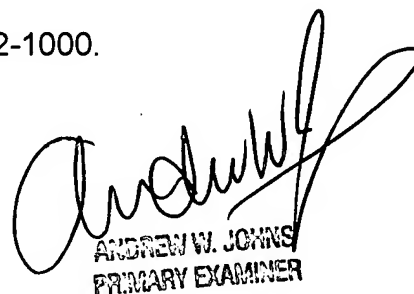
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on (571) 272-7695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Andrae Allison

February 12, 2007

A.A.


ANDREW W. JOHNS
PRIMARY EXAMINER